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The relationship of giving complete immunisation with child development (0–2 years) at Cipinang Muara Health Center

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Abstract
The provision of complete immunisation affects the child's growth and development process. This study aims to analyse the connection between the provision of immunisation and the growth of the child and analyse the connection between the provision of immunisation and the development process. The research design used was a correlational study with a cross-sectional approach. Sample, taken with total sampling technic and there are 63 respondents. The chi-square test result between the provision of complete immunisation and the development process attained p-value = 0,000. The result of another chi-square test between the provision of complete immunisation and growth process attained p-value = 0,104. The conclusion in this research is that there is a connection between the provision of complete immunisation and the development process, and another conclusion is that there is no connection between the provision of complete immunisation and the growth process.

Keywords: immunisation, growth, development

Introduction

Immunisation is the government's effort to achieve the Sustainable Development Goals (SDGs), one of which is to ensure a healthy life and promote prosperity for all people of all ages. The child mortality rate is the leading indicator used to determine public health at the provincial and national levels [1]. Based on these conditions, programs in Indonesia focus on efforts to reduce infant mortality through immunisation.

Primary immunisation is essential given to infants aged 0-12 months to provide immunity from diseases that can be prevented by immunisation, including Tuberculosis, Diphtheria, Pertussis, Tetanus, Polio, Hepatitis B and Measles. 1.5 million children die each year from diseases that can be prevented by immunization [2]. In 2013, more than 2 million children under five missed DPT 3 immunisation, many of whom were poor people. Meanwhile, based on indications of disease prevention, the right of Indonesian children to receive immunisation is still not fully optimised. This fact is also reinforced by a report submitted by the world humanitarian medical organisation, Medicines Sans Frontieres (MSF) or Doctors without Borders, which states that Indonesia is one of 6 countries identified as having the highest number of children are not immunised. 70% of children not covered by routine immunisation programs are spread across the Congo, India, Nigeria, Ethiopia, Indonesia and Pakistan [3]. Immunisation is not evenly found in immunisation coverage in Indonesia. The ten provinces with the poorest populations have around 70% of children who are not immunised. Challenges were found, such as the supply of vaccines management of technical aspects of the national vaccination program. The Drop out Survey in Java in 2011 – 2012 conducted by UNICEF Indonesia, which looked at the knowledge, behaviour and communication practices regarding immunisation, found several challenges and main issues of low immunisation coverage in the form of parents who lack immunisation knowledge, lack of awareness of immunisation services in the environment. Parents' trust in misinformation due to their traditional beliefs, poor way of providing information by health workers, wrong beliefs held by these health workers, ineffective use of messages and not responding to local information needs, lack of support from cultural and religious leaders in the community.

The data above shows that there are still many challenges in providing immunisation in Indonesia. At the same time, immunisation plays an essential role in the growth and development of children. Complete immunisation will make the child's body immune to tuberculosis, Diphtheria, Pertussis, Tetanus, Polio, Measles and Hepatitis B. Growth and development are significant for living things, namely, maintaining survival and preserving offspring. Growth and development, in general, have the same meaning, but in particular, they are different [4]. Growth can be interpreted as quantitative changes involving physical aspects, such as changes in the organs and structures of physical organs so that children get older and get taller. Development, in particular, can be interpreted as qualitative and quantitative changes concerning aspects of human psychological mentality. So, with this development, the child will have more knowledge and abilities and better social, moral, and religious beliefs. One of the things that can support growth and development is immunisation. It is hoped that this research can provide an overview of the importance of giving immunisations to children. Based on the description in the background of the problem above, the research question can be formulated as follows "Does complete

immunisation in children 0-2 years affect growth and development and nutritional status in children?" intending to know the effect of complete immunisation on the growth and development of infants 0-2 years and the growth status of infants 0-2 years.

Theoretical Review

The knowledge that we have gained through the history of the development of immunology enables us to understand the concepts of immunology. The discipline of immunology developed from the observation that those who recover from certain infectious diseases become protected against those diseases. Immunos (Latin) means to be excluded, and immunity (English) means to be protected from infection [5]. The history of immunology has just begun more than 100 years by Louis Pasteur, who is considered the Father of Immunology. When we think about cellular immunology, history only began in 1950. Smallpox was first recorded in China and then spread to Turkey and Central Asia via traditional trade and eventually to the rest of the world. The human body is equipped with a series of defence mechanisms that prevent the entry and spread of infectious agents known as the immune system. The immune system can be divided into the natural or non-specific (natural/in native) and acquired or specific (adaptive/acquired) immune systems [5].

The immune response is mediated by various cells and soluble molecules secreted by these cells. The primary cells involved in immune reactions are lymphocytes (B cells, T cells, and NK cells), phagocytes (neutrophils, eosinophils, monocytes, and macrophages), accessory cells (basophils, mast cells, and platelets), and immune cells network. Soluble substances secreted can be antibodies, complement, inflammatory mediators, and cytokines. However, not a significant part of the immune response, other cells in the tissue can also participate by signalling to lymphocytes or responding to cytokines released by lymphocytes and macrophages. The immune system is divided into the non-specific immune system and the physiologic-specific immune system.

Immunisation is a way to increase a person's immunity to an antigen so that when he is later exposed to a similar antigen, the disease does not occur [6]. Immunisation comes from the words immune, immune, resistant. Immunisation means that the child is given immunity against a particular disease. Children are immune to one disease but not immune to other diseases.

Immunisation is an effort to provide immunity to infants and children by introducing vaccines into the body so that the body makes antibodies to prevent certain diseases. At the same time, vaccines are materials used to stimulate the formation of anti-substances inserted into the body through injections such as BCG, DPT, Measles, and by mouth vaccines such as the polio vaccine. Immunity to infectious disease can be classified into passive immunity and active immunity. Passive immunity is immunity obtained from outside the body, not made by himself, for example, immunity in the fetus obtained from the mother or immunity obtained after administration of immunoglobulin injections. Passive immunity does not last long because the body will metabolise it. At the same time, active immunity is an immunity made by itself due to exposure to antigens such as immunisation or natural exposure. Active immunity lasts longer than passive immunity due to immunologic memory [7].

Immunisation is the passive transfer or transfer of antibodies, while vaccination is intended as giving vaccines (antigens) that can stimulate the formation of immunity (antibodies) from the immune system in the body [8]. Passive immunity can be obtained from administering two kinds of forms, namely non-specific immunoglobulins or gammaglobulins and specific immunoglobulins derived from plasma donors who have recovered from certain diseases or have recently received vaccines for certain diseases.

The purpose of immunisation is to prevent certain diseases in a person and eliminate certain diseases in a group of people (population) or even eliminate certain diseases from the world, such as variola smallpox immunisation. The latter situation may occur in types of diseases that can be transmitted through humans, such as diphtheria [9; 10]. The immunisation program aims to provide immunity to infants to prevent the illness and death of infants and children caused by frequently infectious diseases.

There are several benefits of immunisation, including a) Preventing suffering caused by illness, possible disability or death; b) Eliminating anxiety and psychological treatment when the child is sick. Encouraging the formation of a good family if parents believe that their child will have a comfortable childhood, and c) improving health and achieving the Sustainable Development Goals (SDGs). Immunisation is divided into two, namely active immunisation and passive immunisation. There are several types of immunisations, namely as follows: a) BCG (Bacille Calmette-Guerin), Measles, Hepatitis B, Measles, Mumps, Rubella (MMR), Hepatitis A, Typhoid and Paratyphoid, Varicella, and Pneumococci**.** The principle of development can be summed up as follows: Development is a continuous process that occurs from conception until it reaches maturity. It means that development has started to occur while we are in the uterus, and birth is also a part of development [11].

The stages of development are the same in every child, but the speed of development in each child is undoubtedly different [12]. For example, a child must learn to sit before he learns to walk, but the age at which a child learns to sit is undoubtedly different from other children. Development is closely related to the maturity of the nervous system in children. For example, no exercise can make a child walk if his nervous system is not ready for it. Nevertheless, lack of practice can make this ability decrease. Activities that are general in children will turn into specific responses to the development process. For example, a child will move his hand's feet and laugh when he sees something exciting or what he wants [13]. At the same time, adults will only smile and reach for the object.

Development has a cephalocaudal nature or pattern. It can be interpreted that the development direction is from top to bottom. The first stage before a child learns to walk is the ability to control the head or develop the child's

neck muscle strength [14]. Development is a progressive and continuous change in an individual from birth to death. Another understanding is Changes experienced by individuals or organisms towards their level of maturity, which takes place systematically, progressively, and continuously both physically and psychologically.
Characteristics of development in general, namely: a) Changes occur in physical aspects (changes in body weight and organs) and psychological aspects (maturity of the ability to think, remember, and be creative); b) There is a change in the proportions: physical aspects (the proportion of the child's body changes according to the developmental phase) and psychological aspects (changes in imagination from fantasy to reality); c) The disappearance of other signs: physical signs (the disappearance of the thymus gland (the child's gland) with age), psychological aspects (the disappearance of child movements and impulsive behaviour); and d) Obtaining new signs; physical signs (change of teeth and sex characteristics in adolescence) psychological signs (development of curiosity about knowledge, morals, interactions with the opposite sex).
Factors Affecting development, namely: a) heredity factor (inherited from birth/congenital); b) Environmental Factors; c) Maturity of organic and psychic functions; and d) Children's activities as free subjects who have the will, the ability to select, can reject or approve, have emotions, as well as efforts to build themselves.
From several studies that have been conducted, it appears that children who are breastfed are much more mature, more assertive, and show better progress on the developmental scale than those who are not breastfed [15]. Infants who were exclusively breastfed for six months could crawl and sit earlier than those who had received complementary foods at four months of age. In addition to improving the relationship between mother and child, breastfeeding is often associated with increased neuro-cognitive development of children, especially in babies born with low birth weight and breastfed for longer. Genetic and environmental factors influence children's cognitive development. Parents play a role in creating an environment that supports the stimulation needed for children's cognitive development and provides adequate nutrition [16]. Babies who are breastfed for less than three months have a lower IQ than breastfed babies for six months or more. More prolonged breastfeeding gives benefits to children's cognitive development. Another study conducted prospectively on breastfed babies showed IQ test results (aged 7-8 years) with 8.3 points higher than premature babies who received formula milk [17, 18, 19].
Growth is an increase in the size and number of cells and intercellular tissue, quantitative in nature, so it can be measured using units of length, units of weight, and head size [20]. There are many ways to tell if a person's growth is good or bad. Growth can be seen from a person's nutritional status. The better the nutritional status of a person, the better his growth will be. A person's nutritional status can be seen from his weight height [21, 22].

Research Method

This study used a correlational study with a cross-sectional approach to determine the effect of complete immunisation on the growth and development of children 0-2 years. The research location was conducted at Cipinang Muara Health Center, East Jakarta. The study time was carried out in the period November 2016 – December 2016. The population is the totality of all objects or individuals that have confident, clear, and complete characteristics to be studied. The population in this study were children aged 0-2 years at the Cipinang Muara Health Center, East Jakarta. The number of samples in this study was 63 children, and the number of samples was determined using the Total Sampling technique. The inclusion criteria in this study were mothers who had children 0 – 2 years old, had a Health Card (KMS), and were registered as members of the puskesmas. Methods of collecting data in this study are as follows: a) Prepare the tools needed for research such as pre-developmental screening questionnaires (KPSP), Anthropometry of Nutritional Status, Cards Towards Healthy (KMS), Small objects (raisins, nuts), two cubes of size 2.5 cm x 5.0 cm, and the ball is small; b) View the respondent's Towards Health Card (KMS) to assess the medical status of the child in giving immunisations. Immunisations include Hepatitis B, BCG, DPT, Polio, Measles; c) Measuring children's growth using anthropometric nutritional status with BW/U index and using the threshold formula (z-score) (to determine whether nutritional status: 1) Malnutrition: <-3 SD; 2) Malnutrition: -3 SD to <-2 SD; 3) Good nutrition: -2 SD to 2 SD; and 4) Overnutrition: >2 SD; d) Using the Developmental Pre-screening Questionnaire to find out the child's development by answering several questions. KPSP is given according to the age of the child. Score 1: if the answer is "yes", score 0: if the answer is "no". From these calculations, the results obtained: appropriate = 9 – 10, doubtful = 7 – 8, there is a deviation of 6 or less than 6.

Result and Discussion

Table 1: Characteristics of Respondents by Gender

		Respondents	
No	**Sex**	**n**	**(%)**
1	Male	29	46.0
2	Female	34	54.0
	Total	**63**	**100.0**

Table 2: Characteristics of Respondents by Age

		Respondents	
No	**Age**	**n**	**(%)**

1	0-3 month	6	9.5
2	4-6 month	10	15.9
3	7-9 month	13	20.6
4	10-12 month	4	6.3
5	13-15 month	15	23.8
6	16-18 month	7	11.1
7	19-21 month	3	4.8
8	22-24 month	5	7.9
	Total	63	100.0

Table 3: Characteristics of Respondents Based on Completeness of Immunisation

		Respondents	
No	**Immunisation Status**	**n**	**(%)**
1	Complete	51	81.0
2	Incomplete	12	19.0
	Total	63	100.0

Table 4: Characteristics of Respondents Based on Children's Nutritional Status

No	**Nutritional status**	**Respondents**	
		n	**(%)**
1	Good Nutrition	61	96.8
2	Poor Nutrition	2	3.2
Total		63	100.0

Table 5: Characteristics of Respondents Based on Child Development

		Respondents	
No	**Child Development Status**	**n**	**(%)**
1	Well	41	65.1
2	Doubtful	14	22.2
3	Bad	8	12.7
	Total	63	100.0

Table 6: Distribution of Immunisation Status by Child Development Status and Gender

sex			**Child Development Status**			**Total**
			good	**bad**	**doubtful**	
Male	Immunisation Status	complete	17	0	5	22
		incomplete	0	6	1	7
	Total		17	6	6	29
Female	Immunisation Status	complete	24	0	5	29
		incomplete	0	2	3	5
	Total		24	2	8	34
Total	Immunisation Status	complete	41	0	10	51
		incomplete	0	8	4	12
	Total		41	8	14	63

Table 7: Distribution of Immunisation Status by Child Development Status

Immunisation Status	**Child Development Status**		
	good	**bad**	**doubtful**
complete	41 80,4 %	10 19,6 %	0 0,0 %
incomplete	0 0,0 %	4 33,3 %	8 66,7 %
Total	41 65,1 %	14 22,2 %	8 12,7 %

Table 8: Chi-square test results of immunisation status on child development status

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-square	44.471	2	.000

Table 9: Correlation Test Results of Immunization Status on Child Development Status

Symmetric Measures					
		Value	Asymptotic Standardised Error	Approximate T[b]	Approximate Significance
Interval by Interval	Pearson's R	.445	.101	3.882	.000[c]
Ordinal by Ordinal	Spearman Correlation	.543	.103	5.049	.000[c]
N of Valid Cases		63			

Table 10: Distribution of Immunization Status Based on Children's Nutritional Status

Immunisation Status	Nutritional status	
	good	poor
complete	50 98,0 %	1 2,0 %
incomplete	11 91,7 %	1 8,3 %
Total	61 96,8 %	2 3,2 %

Table 11: Chi-square Test Results of Immunisation Status on Children's Nutritional Status

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-square	4.526	2	.104

Table 12: Correlation Test Results of Immunization Status on Nutritional Status

Symmetric Measures					
		Value	Asymptotic Standardised Error	Approximate T[b]	Approximate Significance
Interval by Interval	Pearson's R	.024	.105	.191	.849[c]
Ordinal by Ordinal	Spearman Correlation	.139	.164	1.097	.277[c]
N of Valid Cases		63			

Characteristics of Respondents by Gender-Based research that has been conducted on children at the Cipinang Muara Health Center shows that from 63 respondents, it was found that the number of respondents with male sex was 29 respondents (46%). Meanwhile, respondents of female sex amounted to 34 respondents (54%).

Characteristics of Respondents Based on Age-Based on research that has been conducted on children at the Cipinang Muara Health Center, it shows that of the 63 respondents, the most respondents were aged 13-15 months (23.8%) then aged 7-9 months (20.6%) and aged 4-6 months (15.9%) and at least 19-21 months (4.8%).

Characteristics of Respondents Based on Immunisation - Based on the research results on children at the Cipinang Muara Health Center, it showed that respondents with complete immunisation were 51 respondents (81%) and respondents with incomplete immunisation were 12 respondents (19%). Immunisation is essential to provide protection prevention and build children's immunity against various infectious and dangerous diseases that can cause physical disability and even death [23]. Providing complete and on schedule immunisation is beneficial for producing immunity against disease and preventing the transmission of disease or epidemics.

Characteristics of Respondents Based on Child Growth / Child Nutritional Status - Based on the results of research on children at the Cipinang Muara Health Center, it shows that respondents based on the nutritional status of children with good nutrition are 61 respondents (96.8 %), while children with poor nutrition are two respondents (3, 2 %). Nutritional status is closely related to growth, so nutritional status must be considered to know the baby's growth [24].

Characteristics of Respondents Based on Infant Development - Based on the results of research on children at the Cipinang Muara Health Center, respondents based on child development with good development amounted to 41 respondents (65.1 %), poor development amounted to 8 respondents (12.7%) and doubted development amounted to 14 respondents (22.2%).

Every stage of a child's development is a significant period. However, every child has a different pace of development. Therefore, parental care is needed to encourage children to reach the peak of optimal development (gain moment), especially in the golden period of their life [2]. In the golden period, children need proper nutrition and stimulation so that their brains develop optimally and in general. Children who have average growth and development patterns result from the interaction of many factors that affect their growth and development [25].

Relationship between Immunization Status and Child Development - The study results on children totalling 63 respondents, who had complete immunisation status and experienced good development were 41 respondents (80.4%), while those whose development was doubtful were ten respondents (19.6%). While the respondents whose immunisation status was incomplete and experienced poor development were eight respondents (66.7%), while those whose development was doubtful were four respondents (33.3%), and those who experienced good development were 0 respondents.

The results showed that 17 respondents had male gender and had good developmental status, six respondents had dubious development status, and six respondents had poor developmental status. Respondents who are female and have good developmental status are 24 respondents, eight respondents have dubious development status, and two respondents have poor developmental status.

The chi-square test results (X2) showed the value of p = 0.000. This p-value is smaller than the value of = 0.05, indicating a relationship between completeness of immunisation status and development in children at the Cipinang Muara Health Center; thus, Ha is accepted, and Ho is rejected. In the correlational test, the p-value = 0.445, meaning that there is a moderate correlation between the completeness of immunisation status and the development of children at the Cipinang Muara Health Center.

Based on the analysis results in the table above, it was found that respondents were fully immunised, but their developmental status was dubious. We need to know that aspects of development include cognitive aspects, physical aspects, language aspects, socio-emotional, moral and spiritual. Although immunisation is complete, development is not only based on one thing because the development pattern takes place in several stages [26]. One of the development principles is that the stages of development or sequence of development in every child are the same; what differs is the speed of development itself. For example, a child must learn to sit first before he can walk, but at what age he can sit and walk, of course, varies.

The results of this study are in line with the research conducted that shows 53 respondents experienced growth average with complete immunisation and 16 respondents were not given complete immunization [27]. The results of this study are also in line with the results of research conducted that shows 24 respondents were given primary immunisation and had good developmental status. Meanwhile, respondents who did not receive primary immunisation have dubious developmental status [28].

Based on the study results, the researchers found that the cognitive aspects of infants who received complete immunisations gave good results compared to infants who did not receive complete basic immunisations. Relationship between Immunisation Status and Child Growth - The study results on children totalling 63 respondents, who had complete immunisation status and had good nutritional status were 50 respondents (98.0%), and those who had poor nutritional status were one respondent (2.0%). While the respondents who have incomplete immunisation status and have good nutritional status are 11 respondents (91.7%), and those who have poor nutritional status are one respondent (1.6%).

The results also showed that 21 respondents had complete immunisation status and were well-nourished, while six respondents had incomplete and well-nourished immunisation status of 29 respondents had complete and well-nourished immunisation status. In comparison, five respondents had incomplete and well-nourished immunisation status. The chi-square test results (X2) showed the value of p = 0.104. This p-value is greater than the value of = 0.05, indicating no relationship between completeness of immunisation status and growth in children at the Cipinang Muara Health Center; thus, Ho is accepted, and Ha is rejected. In the correlational test, the value of p = 0.024 means a low-level correlation between the completeness of immunisation status and the development of children at the Cipinang Muara Health Center.

The provision of primary immunisation has a relationship with the nutritional status of infants. From the chi-square test results in their research, it was found that the value of p = 0.000 where p was smaller than = 0.005. In contrast to the results found by researchers where the p-value = 0.104, which indicates there is no relationship between immunisation status and nutritional status in children [29]. The results of this study are also different from the results of research with the research title "Relationship of Complete Immunization with Nutritional Status in Toddlers Age 1-5 Years in Watonea Village, Katobu Health Center Work Area, Muna Regency." That found out of 44 respondents with complete immunisation, and there were 28 respondents (40%) who have good nutrition and 16 respondents (22.9%) who have less nutrition. Of the 26 respondents with incomplete immunisation, there are two respondents (2.9%) who have good nutrition and 24 respondents (34.3%) who have less nutrition [30].

However, the results of this study are in line with the results of the research title "Analysis of Factors Affecting the Incidence of Undernourishment in the Work Area of the Cebongan Health Center". In this study, it was found that immunisation did not affect the nutritional status of children under five. All malnourished or well-nourished toddlers have received complete immunisations [31]. According to Martin and Roosita's research, there is no trend that the more complete the infant's immunisations are, the lower the frequency of infant illness and the greater the duration of illness of the baby. From the study results above, there were 11 respondents with incomplete immunisations but good nutrition. It is because immunisation is not the only factor that determines the nutritional status of children. Another factor that can determine the nutritional status of the child is said to be good is a mother who is diligent in giving breast milk (ASI) because children with excellent breast milk intake are proven to have very different abilities than children whose milk intake is not available at all. In addition, factors that affect children's nutrition are the level of parental knowledge, family income level, and the baby's weight at birth [32]. Based on the study results, the researcher believes that immunisation is not the only factor that determines the nutritional status of children. Many other factors determine the nutritional status of children. One of them is breastfeeding.

Conclusion

Based on research conducted in November 2016 – December 2016 at the Cipinang Muara Health Center, East Jakarta, it can be concluded that: a) Most of the complete immunisations were given to children at the Cipinang

Muara Health Center, East Jakarta. Of the 63 respondents, as many as 51 respondents (81.0%) had received complete immunisation; b) The growth of children based on the nutritional status of children (BB/U) at the Cipinang Muara Health Center, East Jakarta, was mostly in the good nutrition category. Of 63 respondents, 61 respondents (96.8%) already have good nutrition; c) The development of children at the Cipinang Muara Health Center, East Jakarta, is mostly good. Of the 63 respondents, 41 respondents (65.1%) had good development status; d) There is a significant relationship between completeness of immunisation and child development at the Cipinang Muara Health Center, East Jakarta. The value of p = 0.000 is smaller than = 0.005; and e) There is no relationship between completeness of immunisation and child growth at Cipinang Muara Health Center, East Jakarta. The value of p = 0.104 is greater than = 0.005.

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